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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/965,617	09/27/2001	Trent M. Molter	PES-0039	8137
23462	7590	04/08/2004	EXAMINER	
CANTOR COLBURN, LLP			WILLS, MONIQUE M	
55 GRIFFIN ROAD SOUTH			ART UNIT	PAPER NUMBER
BLOOMFIELD, CT 06002			1746	

DATE MAILED: 04/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary**Application No.**

09/965,617

Applicant(s)

MOLTER ET AL.

Examiner

Wills M Monique

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-14, 16-18, 20-23, 25-29 and 31-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-14, 16-18, 20-23, 25-29, 31-41 and 43 is/are rejected.
- 7) ☒ Claim(s) 42 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is responsive to the Amendment filed January 14, 2004. The rejection of claim 24 under 35 U.S.C. 102(b) as being anticipated by Tatchev WO 99/16546, is overcome. The rejection of claims 21-22 under 35 U.S.C. 102(b) as being anticipated by Hayashi et al. GB 1,252,463, is maintained. The rejection of claims 21-22 under 35 U.S.C. 102(b) as being anticipated by Shimamune et al. EO 0 606 051, is maintained. The rejection of claims 1-3,5-14,16-18,20-23, 25-29, 31, under 35 U.S.C. 102(e) as being anticipated by Koschany et al. U.S. Patent 6,183,898, is maintained. The rejection of claims 1, 4-14, 16-26, 27,30-32 under 35 U.S.C. 102(b) as being anticipated by Zuber et al. U.S. Patent 6,156,449, is maintained. The rejection of claims 33-35 under 35 U.S.C. 103(a) as being unpatentable over Dine et al. U.S. Pub. 2002/0098393, in view of Zuber et al. U.S. Patent 6,156,449, is maintained. The rejection of claims 33-35 under 35 U.S.C. 103(a) as being unpatentable over Dine et al. U.S. Pub. 2002/0098393, in view of Zuber et al. U.S. Patent 6,156,449, is maintained. Claim 42 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Claims 36,38 & 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koschany et al. U.S. Patent 6,183,898 and further in view of Hampden-Smith et al. U.S. Pub. 2002/0107140. Claims 37,39, 40 & 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koschany et al. U.S. Patent 6,183,898 and further in view of Buysch et al. U.S. Patent 6,548,445.

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Allowable Subject Matter

Claim 42 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 42 would be allowable over the prior art of record, because the prior art is silent to a gas diffusion electrode comprising a diamond support.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Hayashi et al. GB 1,252,463.

Hayashi teaches making an air electrode by mixing an active carbon support with a silver catalyst and water repellant (page 3, lines 34-40). The carbon support is inherently non-oxidizable at anodic potentials of less than about 4 volts. Therefore, the instant claims are anticipated by Hayashi.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimamune et al. EO 0 606 051.

Shimamune teaches making a gas electrode by mixing an active carbon support with a gold catalyst (abstract and Example 2' '). The carbon support is inherently non-oxidizable at anodic potentials of less than about 4 volts. Therefore, the instant claims are anticipated by Shimanune.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3,5-14,16-18,20-23, 25-29, 31, are rejected under 35 U.S.C. 102(e) as being anticipated by Koschany et al. U.S. Patent 6,183,898.

Koschany teaches a gas diffusion electrode comprising a catalytically active material (col. 4, lines 50-55). The catalytically active material includes a catalyst from transition group VIII and IV and preferably platinum (col. 4, lines 49-55, claim 18) present in an amount greater than 2% (col. 4, lines 55-60) and an ion conducting polymer selected from perfluorinated polymers (fluorinated binder material such as perfluorinated polymers (fluorinated ethylene-propylene copolymers or polytetrafluoroethylene), polyether ketones, polyether sulfones, polysulfones, polybenzimidazoles, polyphenylene sulfides, polyimide, polyamide or polyphenylene oxides (col. 3, lines 15-25) and a sulfonated fluorocarbon ion exchange resin such as Nafion® (col. 8, lines 50-55, claims 6-9) present in amount up to 90% (col. 4, lines 60-68) and electrically conductive carbon up to 50% (col. 3, lines 30-35, claims 11-14). The support material may include carbon or carbon fibers, glass fibers or fibers comprising organic polymers, for example polypropylene, polyester (polyethylene terephthalate), polyphenylene sulfide or poly ether ketons (col. 2, lines 40-50). The support is inherently non-oxidizable at anodic potentials of less than about 4 volts (claim 1 & 10) and a resistivity of less than about 270 microhm-cenitmeter (clam 16 & 32). The support may also include conductive metal such as gold, silver or nickel (col.

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2, lines 60-68 (claims 11-14). The weight percent of the catalyst, carbon support and proton conductive material encompass the compositions in claims 1-3, 5, 27-29, 31. The electrode is formed by mixing the support, catalyst and proton conductive material (Example 1, claims 21,22 & 25-26. The catalytic active material may be employed in a fuel cell with a second electrode (col. 6, lines 55-65) and a proton exchange membrane interdisposed between (col. 5, lines 65-68 , claim 27). The catalytic active material may be coated with a polymer mesh of polyesters, polyether kentons, polyether sulfons, polysulfons (col. 6, lines 30-40, claims 23 & 26). Therefore, the instant claims are anticipated by Koschany.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5-14, 16-18, 20-23, 25-26, 27,31-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Zuber et al. U.S. Patent 6,156,449.

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Zuber teaches a catalyst layer for polymer electrolyte fuel cells comprising a catalyst layer on a substrate material, wherein the catalyst material contains a proton-conducting polymer (ionomer), electrically conductive carbon particles and fine particles of at least one precious metal (abstract). The ink contains no prefabricated support catalyst but has all the precursors necessary for the layer (solution of the ionomer, precious metal complex compounds and conductive carbon particles), so that the catalyst layer can be produced in one operation. Subsequent introduction of the catalytically active precious metals is not necessary. Col. 5, lines 1-7, for claims 21,22 & 23. The precious metal catalyst includes platinum, palladium, iridium, rhodium and ruthenium or alloys thereof are used as the catalytically active components (col. 5, lines 8-13, claim 18). As ionomers for the ink, the materials of the proton-conducting membranes preferred ionomers include: tetrafluoroethylene-fluorovinyl ether copolymers with acid functions, specially with sulfonic acid groups. Fluorine-free ionomer materials, such as sulfonated polyether ketones or aryl ketones or polybenzimidazoles are also suitable (col. 6, lines 5-15, claim 6) and a sulfonated fluorocarbon ion exchange resin such as Nafion[®] (Table 1, claims 6-9). The support material may include carbon particles, carbon blacks, graphite or activated carbon (col. 6, lines 20-25, claims 11-14 & 20). The precious metal catalyst may be present in an amount of 10 to 40 %, the carbon particles may be present in an amount of 60 to 90% and the ionomer may be present in an amount of 60 to 90% or less than 50% or (col. 6, lines 25-35 and Table 1 and

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Table 2, claims 1,5,27,30,31). The support is inherently non-oxidizable at anodic potentials of less than about 4 volts (claim 1, 10) and resistivity of less than about 270 microhm-cenitmeter (clam 16 & 32). The electrode is employed in a fuel cell with a second electrode and a proton exchange membrane disposed in-between (col. 7, lines 40-55 claim 27). A proton exchange membrane is applied to the electrode catalyst (col. 7, lines 20-30, claims 23 & 26). Therefore, the instant claims are anticipated by Zuber.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dine et al. U.S. Pub. 2002/0098393, in view of Koschany et al. U.S. Patent 6,183,898.

Dine teaches an electrochemical cell comprising an anode 110 with an anode catalyst layer 112, a cathode 114 and a cathode catalyst layer 116, and a solid polymer membrane interposed in between (par. 27,28 & 9). The cathode flow field plate 120 is adjacent to the cathode and the anode flow field plate 118 is adjacent to the anode (par. 28). The anode flow filed plate carries a hydrogen containing fuel

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across the anode from an inlet 130 to an outlet 132 (par. 28). A water coolant loop 132 is in communication with one of the electrodes (par. 28 and /Fig. 1).

Dine is silent to an electrode catalyst material comprising the composition comprising 5 to 95 wt % of a support material, 5 to 95% of a catalyst and up to 50 wt% of a proton conductive material.

Koschany teaches a catalytically active material as described hereinabove that is mechanically stable, and has high electrical conductivity (col. 1, lines 57-68).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the catalytic material of Koschany in the fuel cell of Dine, in order to increase the mechanical stability and electrical conductivity of the electrodes.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Dine et al. U.S. Pub. 2002/0098393, in view of Zuber et al. U.S. Patent 6,156,449.

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Dine teaches an electrochemical cell comprising an anode 110 with an anode catalyst layer 112, a cathode 114 and a cathode catalyst layer 116, and a solid polymer membrane interposed in between (par. 27,28 & 9). The cathode flow field plate 120 is adjacent to the cathode and the anode flow field plate 118 is adjacent to the anode (par. 28). The anode flow field plate carries a hydrogen containing fuel across the anode from an inlet 130 to an outlet 132 (par. 28). A water coolant loop 132 is in communication with one of the electrodes (par. 28 and /Fig. 1).

Dine is silent to an electrode catalyst material comprising the composition comprising 5 to 95 wt % of a support material, 5 to 95% of a catalyst and up to 50 wt% of a proton conductive material.

Zuber teaches a catalytically active material as described hereinabove that is increases electrical power of the electrode (col. 4, lines 45-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the catalytic material of Koschany in the fuel cell of Dine, in order to increase the electrical power of the electrode.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 36,38 & 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koschany et al. U.S. Patent 6,183,898 and further in view of Hampden-Smith et al. U.S. Pub. 2002/0107140.

Koschany teaches a gas diffusion electrode as described hereinabove, including a carbon support.

The reference is silent to a support selected from metal oxides.

Hampden-Smith teaches the equivalence of carbon and metal oxides as catalyst supports (par. 127). The metal oxide includes cobalt (par.132).

Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made because even though Koschany does not teach metal oxide supports, Hampden-Smith teaches that metal oxides and carbon are art recognized equivalent materials for catalyst supports, and therefore, one having ordinary skill in the art would have substituted one catalyst support for the other.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 37,39, 40 & 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koschany et al. U.S. Patent 6,183,898 and further in view of Buysch et al. U.S. Patent 6,548,445.

Koschany teaches a gas diffusion electrode as described hereinabove, including a carbon support.

The reference is silent to a support selected from carbides.

Buysch teaches the equivalence of carbon and carbides as catalyst supports (par. 127). The metal oxide includes cobalt (par.132).

Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made because even though Koschany does not teach carbide supports, Buysch teaches that carbide and carbon are art recognized equivalent materials for catalyst supports, and therefore, one having ordinary skill in the art would have substituted one catalyst support for the other.

Response to Arguments

Applicant asserts that Hayashi et al. GB 1252,463, Shimamune et al. EO 0 606 051, Koschany et al. U.S. Patent 6,183,898 and Zuber et al. U.S. Patent 6,156,449 do not anticipate the subject invention, because each reference teaches a carbon support, and carbon supports are oxidizable at anodic potentials of greater than about 1.5V. Therefore, the references are silent to a support that is non-oxidizable at anodic potentials of greater than 1.5 to less than about 4 volts. This argument is not persuasive. The applicant is essentially asserting that all carbon supports are oxidizable at potentials greater than about 1.5 volts, but the instant specification on page 12, discloses that stable carbon compositions are non-oxidizable within said range. The Applicant has not clearly provided evidence that the carbon materials employed by the references of record do not contain stable carbon compositions. Further, although conventional carbon materials may be oxidizable at potentials greater than about 1.5v, it is unclear as to what range these materials remain oxidizable. For instance, the materials may be oxidizable up to 1.8 volts, leaving the materials non-oxidizable at 1.9 volts to about 4 volts. In that instance, the non-oxidizable range of carbon would anticipate *about 1.5 to less than about 4 volts*.

With respect to the obviousness of Dine, U.S. Pub. 2002/0098393, Applicant asserts that Dine is not a valid reference over the present claims because the reference was filed after the filing date of the Provisional Application to which the

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instant patent application claims priority. This argument is not persuasive, as the effective filing date of the present application is September 27, 2001 and does not date back to the provisional application.

Conclusions

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is

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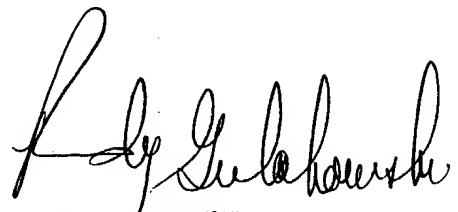
(571) 272-1309. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Randy Gulakowski, may be reached at 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mw

04/04/04


RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700